

Title: Operation Spaghetti

Brief Overview:

The teacher will read the book More Spaghetti, I Say! by Rita Gelman. The students will estimate how much spaghetti the class could eat and figure out the most economical way of feeding spaghetti to the entire class. Estimation and unit pricing will be demonstrated in planning a spaghetti meal.

Link to Standards:

- **Problem Solving** Students will develop and apply strategies to solve various problems. They will interpret results of data for the purpose of solving an original problem.
- **Communication** Students will demonstrate the ability to communicate mathematically both in oral and written language. They will relate physical materials to mathematical ideas and reflect and/or clarify their thinking about mathematical ideas and situations.
- **Reasoning** Students will demonstrate the ability to reason mathematically. They will use known facts and relationships to explain their thinking, and to justify their answers and the solution processes.
- **Connections** Students will link conceptual and procedural knowledge while using mathematics in real-life situations.
- **Estimation** Students will recognize when an estimate is appropriate, determine extent to which estimate is reasonable, and apply estimation in working with quantities, measurement, and problem solving.
- **Number Relationships** Students will expand their understanding of numerical relationships by relating counting and place value concepts through the use of physical materials and real-world experiences.
- **Whole Number Computation** Students will model, explain, and develop proficiency with basic facts. They will select computation techniques applicable to specific problems and determine if results are reasonable.
- **Geometry & Spatial Sense** Students will recognize changes in size and volume.
- **Measurement** Students will develop the process of measuring weight, and concepts relating to unit weight measurements. They will use weight measurements and estimation in problem solving.

- **Statistics** Students will collect, organize, and interpret data recorded on worksheets. They will analyze collected data to formulate and solve problems.
- **Decimals** Students will apply the use of decimals in solving problems based upon comparison and unit pricing.

Grade/Level:

Grades 3 - 5.

Duration/Length:

This activity should take two to three class sessions.

Prerequisite Knowledge:

Students should have working knowledge of the following skills:

- Estimating, rounding and place value
- Add whole numbers
- Numeration
- Multiplication
- Division
- Weights and measurement
- Format for writing a friendly letter

Objectives:

Students will:

- record data in group folder.
- work cooperatively in groups.
- collect and organize data from resources.
- represent and use numbers in a variety of equivalent forms.
- estimate the quantity of spaghetti they will consume.
- construct a chart.
- compute unit price, total cost, and the per student cost.
- write a friendly letter.

Materials/Resources/Printed Materials:

- More Spaghetti, I Say! by Rita Gelman
- Four boxes of spaghetti. Each box should be the same weight but a different brand and price.

- Worksheets for each group (Teacher Resource #1 and #2)
- Four ounces of uncooked spaghetti
- Eight ounces of cooked spaghetti
- Four food scales which measure ounces
- Work station with a hot plate, pan, strainer, salt, and water
- Notebook paper and pencils
- Chart paper

Development/Procedures:

Day 1:

- Review with students concepts learned about multiplication and division.
- Read More Spaghetti, I Say! to the students.
- Ask the students questions and elicit how they feel about spaghetti (i.e., how often do they eat it? Would they give up playing to eat spaghetti? How much do they think they could eat without getting sick like Minnie does in the story?).
- Divide the class into four groups.
- Give each group a box of spaghetti, a scale, and a worksheet (Teacher Resource 1).
- Ask each group member to choose a quantity of uncooked spaghetti that he/she thinks he/she could eat when prepared.
- Instruct each group member to weigh the individual portions selected and record the information on the group worksheet.
- Calculate worksheet data to determine totals of dried proportions that each group feels the group could eat.
- Have one member from each group report to the work station to cook four ounces of spaghetti.
- Provide students with a cooked bowl of spaghetti prepared from an eight ounce dried portion.
- Have students re-evaluate their estimations of how much spaghetti they think they could eat.
- Instruct groups to record the revised estimates on the original worksheet.
- Have students calculate revised estimates to determine the total amount for the group.
- Instruct students to place worksheets in the group folder.

Day 2:

- Record group totals on a class chart to assess the group's average portion size.
- Model how to compute average portion size based upon each groups data and the average size portion per person in the class.
- Review data from chart.
- Facilitate group discussion to demonstrate that various quantities of spaghetti will provide different per person serving sizes.
- Divide class into original groups and distribute worksheet (Teacher Resource 2).
- Distribute the boxes of spaghetti (one per group).

- Instruct the students to compute the cost per ounce for each box of spaghetti, and then pass the box to the next group.
- Compare the cost per ounce for each box of spaghetti.
- Compile the results on the chart.
- Rank the boxes from the most economical to the least economical.

Performance Assessment:

The Principal is planning to have a party for the class who has the best report cards. He is planning to serve spaghetti at the party and would like to know how much spaghetti he needs to purchase to feed thirty students. Remember that there is a limited budget and economy is important. Please write a friendly letter to the Principal explaining how much spaghetti he needs and what it will cost. Make sure you include data from your experiment to support and explain your suggestion.

Develop a rubric with the students for evaluating the activity (Teacher Resource #3). The teacher will grade the papers using the rubric. The teacher must give partial credit for each step of the problem that is solved correctly and give credit for the thought process regardless of the mathematical accuracy.

Extension/Follow Up:

- Establish unit price for other food products.
- Determine the number of noodles in an ounce of dry spaghetti.
- Visit the cafeteria as a group to discuss food portions and cost with the cafeteria manager.

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Spaghetti Weight

Student Name	First Estimate	Revised Estimate
#1		
#2		
#3		
#4		
#5		
#6		
Total		
Average		

Brand Comparison

Brand Name	Price	Cost Per Ounce
#1		
#2		
#3		
#4		

Rank the Spaghetti Brands From the Least to the Most Expensive:

Spaghetti Brand	Price Per Ounce	Price Per Pound
#1		
#2		
#3		
#4		

RUBRICS

Questions to ask yourself while scoring a response:

- Did the student compute a price per ounce amount?
- Did the student choose the most economical method of purchasing the product?
- Did the student order sufficient product to feed the class?
- Did the student arrive at the correct dollar amount for the project?
- Did the student explain the procedures used to determine the answers?

Scoring Rubric:

High Response:

The student explained the procedure fully and arrived at the most economical answer to the problem. The mathematical operations were performed correctly.

Above Average Response:

The student explained the procedure fully that was used to arrive at the most economical answer to the problem. The mathematical operations were performed incorrectly.

Average Response:

The student missed part of the explanation of the procedure used to arrive at the most economical answer to the problem. The mathematical operations were performed correctly.

Below Average Response:

The student missed most of the explanation of the procedure used to arrive at the most economical answer to the problem. The mathematical operations were incomplete and/or incorrect.

Low Response:

The student did not write an explanation of the procedure. The mathematical operations were incomplete.